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INDIGESTION

AN ELEMENTARY STUDY OF

ITS CAUSES AND TREATMENT

BY

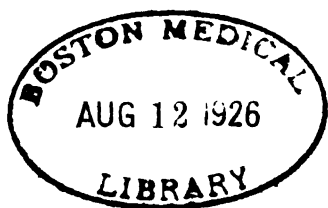


FERNANDEZ CLARKE

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PREFACE.

IN the following few pages, it is my object to point out that although the immediate causes of Indigestion are, in the majority of cases, apparently due to some abnormal state of the stomach, it is to parts more remote that our attention is principally directed when the treatment of digestive failure is considered.

It would be unwise of me to presume that in so small a work as this so large a subject as Indigestion, which practically embraces the entire science of medicine, can be completely dealt with. If, however, I succeed in showing the true causes and explaining their rational mode of treatment, I shall consider myself more than repaid for my efforts.

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CHAPTER I.

DIGESTION.

DIGESTION is a process by which certain foodstuffs undergo changes in the alimentary tract, rendering them capable of being absorbed into the system.

It has been ascertained by analysing the excreta of the lungs, kidneys, skin, and bowels, that certain elements are being continually given off from the body in quantities varying according to the occupation of the individual, the climate in which he lives, and the organ by which they are eliminated. Were these elements not replaced in such quantities as those lost, the body's weight and vitality would suffer in consequence, and it is therefore by the use of various foodstuffs containing carbon, hydrogen, oxygen, nitrogen, and other elements, that the body's equilibrium is maintained.

Although the foods used in the every-day life of man are many and varied, there exist but few which contain the necessary elements in such quantities as are required for supporting life, or in such forms as can be immediately absorbed into the body.

Man's natural diet must, therefore, consist of a mixed

one, and be subjected to the process of digestion before it can be rendered fit to be taken up by the blood and lymphatic vessels.

To understand by what channels the elements necessary for life enter the body, it will be necessary to classify foods according to whether they are ORGANIC or INORGANIC.

The Organic foods include :—

- A. Nitrogenous substances consisting of proteids—*e.g.*, casein, albumen, gluten, &c., and
- B. Non-nitrogenous substances consisting of :
 - (a) Carbo-hydrates—*e.g.*, starches, sugars.
 - (b) Fats and oils.

The Inorganic foods include salts and water.

1. ORGANIC FOODS.

The organic nitrogenous substances are supplied as the flesh of various animals—*e.g.*, beef, mutton, veal, pork, venison, game, poultry, &c.

The organic non-nitrogenous foods, consisting of carbo-hydrates, find their way into the body, being contained in bread made from wheat, maize, barley, rice, &c., also vegetables, especially potatoes and certain fruits.

The oils and fats are supplied in the form of butter, lard, suet, and vegetable oils.

2. INORGANIC FOODS.

Most of the above foods contain the necessary salts in a more or less degree. Potassium is supplied chiefly

by green vegetables and fruit, but is also contained in potatoes and certain meats.

Sodium chloride is found in nearly all solid foods, although in no great quantity, and has, therefore, to be taken as common salt in order to supply the amount necessary for the wants of the body. Calcium salts are contained in eggs, wheat, and most vegetables.

The process of digestion is carried on in the alimentary canal. This canal extends from the mouth to the external opening of the bowels. It measures about 33 feet in length, and is divided into six parts—*i.e.*, mouth, pharynx, œsophagus, stomach, small intestine, large intestine.

The Mouth is situated at the commencement of the alimentary canal. When closed it is bounded anteriorly and laterally by the teeth and above by the hard palate; below by the tongue and mucous membrane; behind by the soft palate and fauces.

During lifetime the mouth is provided with two sets of teeth. The first appears during childhood, and has been termed the milk, or temporary set; the second, or permanent teeth, appear also early in life, but at a later period than the temporary set. They number thirty-two—sixteen in each jaw, *viz.* :—Four incisors, two canine, four bicuspid, and six molars.

The digestive machinery of the mouth is made up of the teeth, tongue, and three sets of glands, *viz.*, the parotid, near the angle of the jaw; the submaxillary, on the inner surface of the lower jaw in front of the angle; and the sublingual, under the tongue.

These glands secrete the saliva or digestive juice of the mouth, a substance consisting of water, fat, albumen, salts, and an unorganised ferment called ptyalin, possessing the property of converting cooked starches into sugar.

Oral digestion proceeds as follows :—

Food, being received into the mouth, is subjected to the grinding movements of the lower set of teeth against the upper until the material is reduced to a pultaceous mass. The tongue and cheeks greatly help to bring about this result, as by crushing the softer portions against the hard palate and gums, and by changing the position of the food from time to time, any hard material is speedily reduced by being brought into closer contact with the teeth. In this manner the saliva becomes intimately mixed with the food, over which it exerts its property of converting the cooked starch into sugar.

This property is favoured by :—

- (a) Moderate heat (98° F.).
- (b) Good quality and sufficient quantity of the saliva.
- (c) A slightly alkaline medium.
- (d) Complete mastication of the food before the act of deglutition is performed.
- (e) Removal of the products of digestion from the mouth as soon as they are formed.
- (f) Healthy condition of the mouth and its contents.

Certain other conditions retard the property thus :—

- (1) Cold (32° F.).
- (2) Altered state of the saliva, either in quantity or in quality.
- (3) A strongly acid or alkaline medium.
- (4) Accumulation of the products of digestion in the mouth.
- (5) Imperfect mastication of the food.

On the completion of oral digestion, the contents of the mouth pass by way of the œsophagus, or gullet, into the stomach, which is contained in the abdominal cavity.

The Abdomen proper constitutes the largest cavity of the body, being bounded above by the diaphragm; below by the brim of the true pelvis; anteriorly and at the sides by the abdominal muscles, lower ribs, and the bones above the brim of the true pelvis; behind by the vertebral column and muscles covering it.

For the purpose of locating the positions of the viscera contained within it, the abdomen has been divided into nine imaginary regions by two parallel vertical lines drawn from the centre of Poupart's ligament on each side, to the cartilage of the corresponding eighth rib above, and by two parallel transverse lines, one joining the highest points of the crest of the ilia and the other drawn across the abdomen at the level of the ninth costal cartilage.

The regions so formed have been named according

to the positions they occupy. Thus the upper three taken from right to left constitute individually the right hypochondriac, epigastric, and left hypochondriac. The middle, taken in the same order, the right lumbar, umbilical, and left lumbar; whilst the lowest form the right inguinal, hypogastric, and left inguinal regions.

THE STOMACH.

This consists of a dilatation in the alimentary canal, between the lower end of the œsophagus above, and the upper end of the smaller intestine below. It rests almost entirely under cover of the bony thorax beneath the diaphragm and the left lobe of the liver, lying principally in the left hypochondriac and slightly in the epigastric regions. Its shape and size vary according to the amount of distention it possesses, being normally capable of holding from 35 to 49 ounces with comfort. It secretes an acid digestive fluid called gastric juice containing two ferments—*i.e.*, pepsin, possessing the property of converting proteids into peptones, and a milk-curdling ferment called rennin. The acid reaction and antiseptic properties of this juice are principally due to hydrochloric acid, which is secreted in quantities varying from $\cdot 2$ to 2 parts per 1,000. The amount of gastric juice secreted in twenty-four hours varies in different individuals from 10 to 20 pints.

In structure the stomach consists of four coats, viz., from within out:—(a) Mucous, (b) Vascular, (c) Muscular, (d) Peritoneal, together with lymphatics, blood-vessels, and nerves.

The mucous coat is of a pale red colour, and contains the gastric glands. When the organ is empty this coat is thrown into small folds, or rugæ, which disappear when the organ contains food.

The vascular coat is situated between the mucous and muscular coats, and serves to support the blood-vessels, lymphatics and nerves entering the mucous membrane.

The muscular coat consists of three distinct series of muscular fibres arranged in longitudinal, circular, and oblique layers.

The longitudinal fibres are most superficial, and radiate in a stellate manner from the cardiac, or upper, end, where they are continuous with the longitudinal fibres of the œsophagus. Over the surface of the organ these fibres are thinly represented, but are distinct along the curvatures and at the pylorus, where they are continuous with the longitudinal fibres of the small intestine.

The circular fibres are situated chiefly at the pyloric, or lower, end of the stomach, where they are collected into a strong circular band, which, with the mucous membrane covering it, forms the pyloric valve.

The oblique fibres are most distinct at the œsophageal end of the stomach, where, after covering both surfaces of the organ, by passing over them obliquely from right to left and from left to right, they are continuous with the circular fibres of the gullet.

The stomach, being thus provided with two muscular orifices, is capable of being converted into a closed cavity during the period of digestion in the following manner.

The act of deglutition, causing the cardiac orifice to relax, thus permits food to enter the stomach. Immediately this has occurred the orifice contracts, and the organ is again converted into a closed cavity, by which the return of the food is prevented. The muscular coats are then brought into action, and serve to keep the contained food in close relationship with the walls of the organ, and by their alternate contractions and relaxations produce peculiar churning movements, by which every particle of the stomach contents is subjected to the influence of the gastric juice. As digestion advances the pyloric orifice gradually relaxes, first to allow that portion of the food, which cannot be further treated in the stomach, to enter the duodenum, and later, to allow the whole contents of the organ to pass into the small intestine.

The peritoneal coat forms the external covering of the organ, and has the same structure as other serous membranes.

GASTRIC DIGESTION.

Having reached the stomach, food is subjected to various processes. Sugar and any other substances capable of being absorbed pass into the blood-vessels, whilst the proteid material, coming in contact with the gastric juice, becomes converted by the ferment pepsin into peptone—*i.e.*, an albuminous substance possessing the property of passing through animal membranes. Besides dissolving the proteid envelops around the fat cells and thus freeing the contents, gastric juice

has no further effect on pure oleaginous substances, neither has it any action on starchy foods, which therefore pass unaltered into the small intestine. Milk is curdled by the ferment rennin, the casein so produced being first precipitated and then dissolved.

The chief product of gastric digestion is, without doubt, peptone, which, being diffusible, is readily absorbed by the blood-vessels, where, to prevent it from diffusing out again, it undergoes changes giving it the characteristics of the original albumen.

The average time required for complete gastric digestion is between three and four hours, but this greatly depends on the accompanying circumstances—viz., quantity and quality of the food taken; the amount of rest which the stomach has been allowed since the last meal; the state of the individual's health; and the condition of the organ itself.

The following conditions favour gastric digestion :

- (a) Moderate heat (99·6 °F.).
- (b) Complete mastication of the food before it is allowed to enter the stomach.
- (c) An acid medium.
- (d) Good quality and sufficient quantity of food.
- (e) Regular churning movements of the stomach.
- (f) Healthy condition of the stomach, including a normal supply of gastric juice.
- (g) Removal of the products of digestion as soon as they are produced.
- (h) Gentle exercise.

Digestion in the stomach is retarded by —

- (1) Cold.
- (2) Excess or neutralisation of the acid.
- (3) Any disease interfering with its functions.
- (4) An excess of peptone or carbo-hydrate.
- (5) Imperfectly masticated food entering it from the mouth.

On the completion of gastric digestion, such substances as have not been absorbed pass into the small intestine.

THE INTESTINES.

The intestinal canal measures from twenty-four to thirty feet in length, being divided into two portions—the large and small intestines. The portions are continuous with one another, and constitute the gut between the pyloric opening of the stomach and the external opening of the lower bowel. The small intestine, so called on account of its small diameter, is divided into three parts, viz., the duodenum, jejunum, and ileum, measuring together about twenty-two feet.

The Ileum, or lower part of the small intestine, enters the inner side of the commencement of the large intestine opposite the junction of the Colon and the Cæcum. This opening is guarded by a valve, the Ileo-Cæcal valve, placed in such a position that whilst allowing substances to pass from the small to the large intestine the reverse is prevented.

In structure, the small intestine consists of three principal coats, viz., from without inwards, the peritoneal, muscular and mucous.

The peritoneal coat, like that of the stomach, has the same structure as other serous membranes. Being derived from the general peritoneum, this coat entirely envelops the intestines, excepting parts of the duodenum and where the blood-vessels and nerves enter the gut.

The muscular coat consists of two layers of fibres, an internal (circular) and an external (longitudinal), the former being the thicker.

The mucous coat contains a number of villi, as well as the glands of Brunner, Peyer, and Lieberkühn.

The small intestines occupy a position in the front part of the abdominal cavity below the transverse colon, the jejunum lying on the left and the ileum on the right. The coils together are therefore situated in the space below the superior transverse line, but alter their position from time to time according to the amount of distension they possess.

The digestive fluids peculiar to the small intestine include the Pancreatic Juice, Bile, and Succus Entericus.

The Pancreatic Juice is secreted by the Pancreas, a gland situated at the back of the abdomen, lying in the horse-shoe-shaped curve made by the duodenum. The juice enters the intestine by a duct, common to itself and the bile, situated on the inner side of the second portion of the duodenum. In composition, the pancreatic juice consists of a colourless, transparent, alkaline fluid, having a specific gravity of about 10,10, containing four ferments, *i.e.*, trypsin, amylase,

steapsin, and a milk-curdling ferment capable of acting in an acid medium.

FUNCTIONS OF THE PANCREATIC JUICE.

The proteolytic ferment, trypsin, converts proteids into peptones in practically the same manner as does the pepsin of the stomach, with the exception that the former requires an alkaline, instead of an acid, medium, to bring about the same result.

Steapsin possesses the property of emulsifying and saponifying oils and fats.

Emulsification denotes a mechanical process, by which the oils and fats are split up into minute particles in an alkaline medium, and held there in suspension, whilst the original composition of the components remains unaltered.

Saponification denotes a distinct chemical change, brought about in the composition of oils and fats, by which these substances are converted into their component parts, viz., the triatomic alcohol, glycerine; and a fatty acid. The fatty acid combines with an alkali to form a soap, and the glycerine is set free.

The amylolytic ferment, amylopsin, converts those starches, which have escaped digestion in the mouth, into glucose.

The Bile is a viscid, yellow or yellowish-green fluid, having a specific gravity of 10.18, and possessing a strongly bitter taste and a neutral, or slightly alkaline reaction. It consists of water, bile salts, fats, mucus, and a substance called cholesterin, together with

colouring matter. Being continuously secreted by the liver, it is collected by the smaller hepatic ducts and conveyed by these to the common bile duct, which empties it into the small intestine. During the interval of digestion, however, bile regurgitates through the cystic duct to the gall bladder, there to be stored until required for digestion, when it is discharged into the duodenum. Whilst digestion is proceeding the secretion of bile is greatly increased, and passes directly into the duodenum accompanied by the secretion of the pancreas.

FUNCTIONS OF THE BILE.

- (a) Bile helps to emulsify the fats entering the small intestine, rendering them suitable for absorption. This is demonstrated by the presence of undigested fat in the stools of those suffering from obstruction of the bile duct, or any other condition preventing the admission of bile into the intestine.
- (b) Since constipation is a constant symptom of biliary obstruction, and diarrhoea when the secretion is excessive, bile must be regarded as a natural purgative.
- (c) Bile acts as an antiseptic, and prevents decomposition from taking place in the contents of the intestines. This may be shown by adding some bile to a substance undergoing fermentative changes, when the process is either delayed or stopped. Again, the stools of

- biliary obstruction are much more foetid than when the normal amount of bile is present.
- (d) Bile precipitates the pepsin, together with the gastric peptones and proteoses on their arrival in the intestine.

Until lately little was known regarding the functions of the Succus Entericus, but, from the recent researches which have been made, there is no doubt that this juice, exuded from the glands of Lieberkühn, increases the activity of the pancreatic juice in such a manner that it may be said to act as a ferment of a ferment.

DIGESTION IN THE SMALL INTESTINES.

The substances which pass through the pylorus, and so present themselves for intestinal digestion, consist of proteid material, either unaltered or in a state of semi-digestion; starch, which has entirely escaped the action of the saliva, or has become partially converted into sugar; and oleaginous substances. During their passage through the intestine, the contents of the stomach first become neutralised and then alkaline in their reaction. The peptones and proteoses are precipitated, together with the pepsin of the gastric juice, as soon as these come in contact with the bile, after which the trypsin of the pancreatic juice is able to exercise its properties on the albuminous substances which have escaped conversion in the stomach. Through the actions of the bile and steapsin of the pancreatic juice, fats become emulsified and saponified, and are then absorbed by the

lacteals and blood-vessels of the intestine. The starch, which escaped the action of the saliva, or has become partially converted into sugar, is acted on by the amylpsin, and then absorbed by the blood-vessels.

The saline, saccharine, and liquid substances, which have not been absorbed during their stay in the stomach are absorbed soon after their entry into the small intestine.

THE LARGE INTESTINE.

This is also divided into three parts—viz., the Cæcum, the ascending, transverse, and descending Colon, and Rectum, measuring together four to seven feet in length.

The Cæcum consists of a large *cul-de-sac* at the commencement of the large intestine occupying a position in the right inguinal region. From its lower and posterior part arises the vermiform appendix, a structure which has occupied so much attention during latter years.

Commencing in the cæcum, the large intestine passes upwards, as the ascending colon, through the right lumbar and hypochondriac regions to the under surface of the liver, where it forms the hepatic flexure. The gut then crosses the abdomen from right to left, where, at the antero-internal surface of the spleen, it forms the splenic flexure of the colon, occupying, in its passage to this point, parts of the epigastric, umbilical and left hypochondriac regions. The course of the colon is then directed downwards, through the left hypochondriac

and lumbar regions, to the crest of the ilium, where it terminates in the sigmoid flexure lying in the left inguinal space.

In structure, the large intestine consists of mucus, peritoneal, and muscular coats, the latter consisting of two layers, the inner one placed circularly and the outer longitudinally.

The external fibres of the cæcum and colon, besides being arranged over all parts of the walls of the intestine, are also collected into three bundles, which, being shorter than the total length of the gut, cause the canal to become sacculated. In the rectum these bundles intermingle with the other longitudinal fibres, being increased in number and thickness. The circular fibres also envelop this part of the bowel, becoming thicker and stronger towards its lower end, where they form the internal sphincter muscle.

The onward passage of the intestinal contents is mainly due to the peristaltic movements which the intestines perform. These movements are produced by the alternate contractions and dilatations of the muscular coats in a wave-like manner along the canal. The longitudinal fibres contracting first, tend to pull the intestine in an upward direction towards the pylorus, and therefore over the material passing down the canal. The circular fibres, then contracting in succession from above downwards, further help the substance on its downward course. In this manner, the contents of the gut are intimately mixed with the intestinal juices, whilst those materials which are not absorbed eventually

reach the rectum, from which they are expelled by the act of defæcation.

Having studied the principal channels by which insoluble foodstuffs are converted into substances capable of absorption, let us now consider when and how this process fails.

CHAPTER II.

INDIGESTION.

NORMALLY the process of digestion takes place within the body in such a manner as to allow the subject to remain in perfect ignorance of the fact that the food, already eaten, is undergoing changes within the alimentary tract. If, however, the process becomes manifest by the production of painful or disagreeable symptoms, indigestion is then said to be present.

- In order that true digestion may take place, it is essential that the digestive organs and juices should be in a normal condition, but since it is the digestive system which first fails when the body becomes the seat of any disease, it would necessitate the writing of a complete work on medicine in order to describe thoroughly every cause of digestive failure.

For the purpose of convenience the causes of indigestion have, by some, been divided into :—

- (a) Those producing changes in the digestive juices.
- (b) Those producing changes in the digestive organs themselves.

- (c) Those producing alterations in the nervous and muscular tone of the organs.

Although this classification holds good in theory, is very difficult to determine where one cause ends and the other begins, for, when any derangement occurs in any one part of the digestive tract, it is not long before the effects will make themselves felt in parts more remote. As an example of this, let us take a case of anæmia, in which the symptoms of indigestion play a prominent part. The question here will arise as to whether the indigestion is produced by the alteration in the consistency of the digestive fluids, on account of the anæmic state of the blood, or whether the anæmia is secondary to an insufficient supply of nutriment to the body resulting from other conditions existing in the digestive tract, which are themselves giving rise to indigestion. With questions of this description before us, it is better to consider the causes of indigestion as to whether they are PRIMARY or IMMEDIATE.

The PRIMARY CAUSES constitute those which are in the first place responsible for the alterations in the mechanism of digestion, and amongst the commonest of these are :—

- (a) IMPROPER FEEDING, including (1) Irregularity of meals. (2) Imperfect mastication. (3) Unsuitable foods.

I. IRREGULARITY OF MEALS.

In order that the stomach may have the opportunity of regaining its tone after digestion has been completed, nature requires that a certain period of rest be allowed the organ before subjecting it to further activity. This period should not, however, exceed four or four and a half hours, for if a longer time be allowed to elapse, not only will the gastric functions become diminished through lack of nourishment to the system, but the extra food which will be required to compensate the existing hunger will necessarily throw more work on the stomach, the vitality of which, being already lowered, renders the organ incapable of overcoming these demands. As a result of this, food which would have otherwise been digested, had not the gastric functions become diminished by prolonging inactivity, is allowed to remain in the stomach, where, by setting up irritation of the organ, the symptoms of indigestion are given rise to.

2. IMPERFECT MASTICATION.

This may be due to many causes—*e.g.*, by performing the act too hurriedly; ulcers on the tongue, cheeks, tonsils; inflammation of the gums; absence or painful condition of the teeth, especially those used principally in the act of mastication; toughness of food, either from defective cooking or from its natural character; imperfectly fitting artificial teeth, &c.

These causes may act in the following ways:—
Firstly—When the act of mastication is rendered

painful, the mouth is liable to be emptied before the oral digestion is properly completed. The stomach is consequently made to receive food which is unsuitable for gastric digestion, and the organ is thrown into irregular contractions during its efforts to expel its irritating contents. The continuation of this process may lead to an atonic condition of the stomach walls with subsequent dilatation, owing to the extra demand made on the organ's energy. Secondly—If the composition of the saliva be altered, by coming into contact with any septic discharge occurring in the mouth—*e.g.*, pyorrhœa alveolaris, carious teeth, &c., not only is the oral digestion rendered imperfect, but the composition of the gastric juice will also be changed in consequence of the septic material reaching the stomach mixed with the food and saliva. Now, so long as this septic invasion remains at a minimum, the antiseptic properties of the gastric juice may be sufficient to counteract any evil effects which may be given rise to, but when, as so often happens, the oral sepsis is allowed to continue and increase, atrophic changes are liable to occur in the cells of the gastric glands, by which the gastric juice is altered both in quality and quantity. Besides these alterations in the digestive system, further changes may be found in other organs of the body, and certain diseases, which have hitherto been termed idiopathic, are now said to be due to the septic absorption resulting, in the first place, from oral sepsis.

Again, for the body to maintain its healthy state, it

is necessary to select a diet containing a certain amount of proteid, fat, carbohydrate, salts and water, but when this painful condition of the mouth exists, the subject will often indulge in such articles of food as contain an excess of one or more of these substances, and a deficiency in the remainder, in order to be spared any further pain which may be produced by the act of mastication.

As a result of this imperfect diet, a general state of malnutrition is caused, which not only affects the whole digestive system, but prevents the excretory organs from performing their natural functions, and consequently such substances which would, in the ordinary course of events, be eliminated from the body as harmful are allowed to circulate freely through the system.

3. UNSUITABLE FOODS.

Many articles of food, such as pork, veal, salt meats, shell fish, richly made dishes, nuts and beverages, have peculiar effects on certain individuals, even when partaken of in the smallest quantities. In some cases, by irritating the alimentary tract, acute gastritis or intestinal colic may be set up, accompanied by their respective symptoms. In others, peculiar forms of skin eruptions make their appearance, and are said to be due to the derangement of the sympathetic system brought about by the irritating food.

The excessive use of tea, especially amongst the poorer classes, is one of the most important causes of digestive failure met with in this country.

Tea contains from 1 to 4 per cent. of an alkaloid called caffeine, which possesses direct stimulating properties on the central nervous system. It is on this account that tea is so much drunk, as by its use the mental faculties become sharpened and the whole system temporarily rejuvenated.

Besides this stimulating alkaloid, tea contains another substance called tannin, which is found in varying quantities reaching, in some samples, to as much as 20 per cent., and it is on account of the active part played by this substance on the organs of digestion that tea drinking is so injurious.

Tannin possesses strong astringent properties, which diminish the amount of blood flowing through the stomach walls, and therefore the amount of gastric juice secreted, it also precipitates the gastric juice, together with the albumens.

(B) Diseases of the naso-pharynx may give rise to indigestion by their detrimental influences on the general health of the subject.

(C) Diseases and conditions occurring in and around the oesophagus, either producing dysphagia or painful swallowing.

(D) Certain diseases in the body which indirectly influence digestion—*e.g.*, anæmia, chronic bronchitis, gout, rheumatism, renal, hepatic and cardiac diseases, phthisis.

ANÆMIA.

Every organ in the body depends on a healthy state of the blood for the performance of its individual functions. It therefore follows that, when any morbid condition of the blood exists, these functions are materially altered. In anæmia, the nervous system assumes a state of unrest, which influences the gastric nerves to various degrees, so that instead of the movements of the stomach being regular, they may be increased, diminished, or spasmodic in character. The various digestive secretions also become altered, and the digestive muscular tissue, being supplied with blood which is deficient in one or more of its essential components, loses its normal tone.

CHRONIC BRONCHITIS.

Chronic bronchitis may, in some cases, be the initial cause of digestive failure, even when there are no appreciable heart symptoms. This arises from the fact that the patient is continually swallowing quantities of mucus impregnated with micro-organisms, which thus find their way to the stomach, where the changes brought about by their presence resemble those due to oral sepsis, and vary according to the amount and description of the septic infection.

GOUT.

An excess of uric acid in the blood, or whatever cause gout may be due to, predisposes the various tissues of the body to attacks of inflammation. The

stomach and intestines share this tendency, as shown by the prominent digestive symptoms exhibited by those suffering, or about to suffer, from an attack of gout.

RHEUMATISM.

The activity of the digestive system is generally lowered in those subjects possessing a rheumatic tendency. This is on account of the depressing effects which the disease exerts over the nervous system, and also the changes which occur in the blood.

RENAL DISEASE.

Urea ($\text{C O N}_2 \text{H}_4$) is the principal solid excreted by the kidneys. It is by this means that the nitrogen formed by the metabolic changes occurring in the tissues and the superfluous supply taken in the form of food, is able to leave the body. In Bright's disease this excretory function of the kidneys is diminished or lost, and urea has in consequence been found mixed with the gastric and intestinal juices. Again, the secondary anæmia, due to the continued drain of albumen which occurs in this disease, produces an alteration in the function of the digestive organs, by which the composition of their respective secretions is changed.

HEPATIC DISEASE.

Besides secreting the bile, the liver acts as a filter for the blood coming from the digestive organs. It therefore follows that any disease of this gland must

necessarily interfere with these functions, and those substances, which would otherwise have been eliminated or changed in their characters, are allowed to remain in the blood, where they re-act on the digestive organs and their secretions.

CARDIAC DISEASE.

In valvular disease of the heart, the amount of blood normally contained in the arteries is diminished, whilst that of the veins is increased. This being so, in uncompensated valvular disease, the liver will become congested, since the hepatic veins empty themselves into the inferior vena cava, and for a like reason the stomach and intestines will undergo the same changes, since the blood from these organs passes through the liver.

PHTHISIS.

Anæmia, accompanied by loss of appetite, gastritis, and vomiting, is generally a pronounced symptom of this disease. It is on account of the blood becoming impregnated with the products of the bacillus that these symptoms occur. When the digestive organs themselves become the seat of tubercular changes, the greatest alterations may arise in the process of digestion.

(E) The causes of constipation, by encouraging the re-absorption of substances already destined to be eliminated from the body as harmful.

(F) Worms.—The various forms of entozoa which

inhabit the human body, give rise to digestive failure by the irritation they produce on the different parts of the alimentary tract, and their secondary effects on the nervous system.

The IMMEDIATE causes of indigestion constitute those conditions of the digestive tract resulting from the Primary causes already mentioned, and which give rise to the actual symptoms complained of.

Although the gastric juice, nerves supplying the stomach, or the walls of the organ itself may in turn be the seat of the principal changes, it is seldom that any one function of the digestive system becomes altered without being, sooner or later, accompanied by changes in the others. Amongst the commonest alterations may be mentioned :—

(a) INCREASED SECRETION OF HYDROCHLORIC ACID BY THE GASTRIC GLANDS.

When a meal, composed of suitable ingredients, enters the stomach, the normal irritation arising from its presence causes the gastric glands to secrete an increasing quantity of free hydrochloric acid. This secretion usually reaches its maximum about the end of the second hour, when it may amount to as much as 0·2 per cent., but seldom higher. It then diminishes as digestion proceeds, and finally ends when the stomach contents pass through the pylorus into the duodenum.

If, however, the stomach is constantly subjected to hyper-irritation, as from repeated over-indulgence on the part of the patient in food which is unsuitable either in

quantity or quality, the organ becomes congested, and the amount of hydrochloric acid may reach as high as 0.4 per cent., and may be continued to be secreted even after the food has entered the small intestine and the stomach is empty.

On account of this hyper-acidity, the muscular walls of the stomach may undergo spasmodic contractions, even when the organ contains no irritating food, and, owing to the extra demands made upon the gastric nerves and muscular tissue in effecting this increased activity, these factors of the digestive system become impaired in function, thus leading to an atonic condition of the stomach, followed by dilatation, unless the primary causes of the irritation be effectively removed.

Symptoms.—In chronic cases, the subject may be wasted owing to an atonic condition of the stomach. The tongue is furred, and shows plainly where the teeth have been in contact with it. There is usually headache, vertigo, palpitation, and other symptoms referable to the nervous system. Pain, which is due to myasthesia, or to spasm of the gastric walls, may be very severe, and radiates from the lower part of the chest, shooting through to between the shoulders. Its time of appearance is very varied, either coming on immediately after the ingestion of food or when two or three hours have elapsed since the last meal. It is usually relieved by taking food containing an excess of proteid material, which is able to combine with the excess of free hydrochloric acid. Vomiting occurs in a certain number of

cases, the vomited matter consisting of partially digested food in a hyper-acid condition, which, with the other symptoms of pain, &c., may lead one to suspect gastric ulcer. Troublesome flatulency may also be complained of, but is not due to gastric fermentation, as the antiseptic properties of the hydrochloric acid prevents this. It may, however, be due to the liberation of carbonic acid, from the decomposition of the pancreatic carbonates by the excess of hydrochloric acid, which thus passes into the stomach through a relaxed pylorus. The urine is scanty, and in most cases contains an excess of phosphates. The bowels are very irregular, and although constipation is the rule, the reverse is often present in chronic hyper-acidity.

(b) DEFICIENT SECRETION OF HYDROCHLORIC ACID BY THE GASTRIC GLANDS.

When the body is subjected to any disease, or condition, which lowers its vitality, the activity of the digestive system may become greatly reduced. Food entering the stomach no longer stimulates the gastric nerves to secrete a normal amount of gastric juice, and instead of the quantity of free hydrochloric acid being at its maximum about the end of the second hour of digestion, this acid may be entirely absent at that period from the gastric contents, which, thus deprived of their antiseptic properties, are liable to undergo fermentative changes. The diminished motor activity of the stomach also favours the retention of food in the organ long after the time normally occupied for its digestion has elapsed, and

this factor, together with the lax condition of the muscular walls, may, in many cases, be followed by dilatation.

Symptoms.—These are mostly due to the gastric condition supplemented by those arising from its primary causes. Thus, there may be a marked wasting and general flabbiness of the muscles. There may be a feeling of fulness and oppression immediately after a meal, which may continue until the stomach has been able to empty itself. When dilatation has occurred, flatulence, and other symptoms referable to this condition of the stomach, will also be manifest.

(c) ACUTE GASTRITIS.

Acute inflammation of the stomach is mostly due to some dietetic error on the part of the patient, but is more apt to occur in those who are subject to constitutional diseases, such as gout, phthisis, rheumatism, than in those who are previously healthy.

Symptoms.—The attack is usually sudden, coming on with a feeling of discomfort in the gastric region, shortly followed by vomiting and retching. The vomited matter at first consists of food already eaten in a state of fermentation, but later, when the stomach has been entirely emptied of solid material, it consists of an acid watery mixture of bile and mucus, which may also contain blood when the acts of emesis have been prolonged and violent. Pain in the epigastrium may be very severe, and cause the patient to exhibit symptoms simulating those of collapse. The duration of an attack of this de-

scription is usually short, the patient soon recovering his normal state directly the acute symptoms have subsided. This, however, is not always the case, and sub-acute gastritis may remain long after the attack has passed off, or chronic gastritis result, when the acute attacks are of frequent occurrence.

(d) CHRONIC GASTRITIS.

Besides repeated attacks of acute inflammation, this condition is also met with as a result of prolonged indulgence in gastric irritants, such as too hot foods, alcohol, tea, or a diet which is deficient in any one of the necessary constituents. It is also associated with those diseases which lower the vitality of the body, *i.e.*, tubercle, rheumatism, anæmia, gout, renal and cardiac disease. The condition of the stomach is such that the mucous membrane becomes congested and covered with a thick layer of mucus, whilst many of the secreting glands, together with their ducts, may undergo fatty degeneration and atrophic changes. The gastric juice is thus altered in quantity and quality ; the natural churning movements of the stomach are diminished, and the food, becoming mixed with the excessive secretion of mucus, is, therefore, prevented from being properly acted on by the gastric secretions, such as they are.

Symptoms.—The symptoms of chronic inflammation vary so considerably that two cases are seldom met with in which they are alike. In the commonest forms there is gastric discomfort after food, accompanied by flatu-

lence, acidity, dyspnœa, palpitation, and other phenomena due to gastric fermentation. On account of the discomfort following a meal, the patient may limit himself to a fluid diet, or one which is deficient in the necessary constituents, hoping by doing so to evade unnecessary pain, which a more liberal diet might occasion. The condition of the stomach is thereby aggravated by the continuation of its principal cause, which again re-acts on the digestive system by lowering the vitality of the other organs. The diminution in the amount of hydrochloric acid secreted, favours incomplete digestion and fermentation of the gastric contents, which, on reaching the intestines, give rise to irritation and fermentation in that situation. The bowels are irregular and offensive, being alternately confined and relaxed every two or three days.

(c) SIMPLE ULCER AND PRIMARY MALIGNANT DISEASE OF THE STOMACH.

These diseases, although classified as primary, constitute two of the immediate causes of indigestion.

SIMPLE ULCER.

In this condition, the characters of the gastric juice become altered on account of the accompanying gastritis. The organ is extremely irritable, and painful spasms of its muscular walls occur on the introduction of the smallest amount of food. On account of the irritation caused by the ulcer, the gastric juice may be continually secreted, as shown by the presence of

hydrochloric acid, and gastric ferments, in the stomach long after digestion has been completed, and for this reason fermentative changes are unlikely to occur in the gastric contents.

Symptoms.—The principal symptoms of gastric ulcer are pain, vomiting, hæmatemesis. The pain is usually confined to one situation about the epigastrium, at a point below the ensiform cartilage and to the right of the middle line. In character, it ranges in every degree of intensity, varying from the dull aching to a sharp stabbing description. It makes its appearance immediately, or soon after the introduction of food into the stomach, and usually remains until the contents have left the organ by either passing into the duodenum, or by being vomited. As regards the course of the disease, vomiting may occur at any time. The vomited matter consists of food, already eaten, in a state of incomplete digestion, showing an increase in the amount of hydrochloric acid.

Hæmatemesis occurs in about 50 per cent. of the cases of gastric ulcer. When small in amount, it becomes mixed with the acid gastric contents, which, when vomited, present the characteristic coffee grounds appearance due to the conversion of the hæmoglobin into hæmin.

When the hæmorrhage is large, the patient will exhibit symptoms of internal bleeding, and the vomited matter may then contain blood, retaining its arterial characters. In some cases, all, or a quantity, of the

blood may escape into the intestines, producing melæna. Repeated hæmorrhages may give rise to profound anæmia, and, owing to the malassimilation of food, the patient will be greatly reduced, both in weight and strength. Death may take place either from exhaustion or from the ulcer perforating into some vital organ.

(f) MALIGNANT DISEASE.

The disturbances of digestion, occurring in cancer of the stomach, are principally due to the digestive system sharing in the general debility caused by the disease. The accompanying anæmia will necessarily alter the digestive secretions, and it has been actually found that, in some cases of malignant disease of the stomach, the hydrochloric acid is entirely absent from the gastric juice. The movements of the organ may also be limited owing to the adhesions which the disease has contracted with neighbouring viscera, and in those cases, where the pylorus has become implicated, chronic obstruction may further complicate matters.

Symptoms.—These simulate to a certain extent those of gastric ulcer—viz., pain, vomiting, hæmatemesis.

Pain is a constant symptom, and occurs in about ninety per cent. of the cases met with. It is mostly of a continuous, gnawing character, varying in intensity, and increased on the introduction of food into the stomach. It is diminished, but not entirely eradi-

cated, by the act of vomiting. As regards situation, it may be confined to one position about the epigastrium, or may be diffused over the whole gastric area radiating through to the back, where it may be mostly complained of.

Vomiting takes place in about thirty per cent. of the cases, and is mostly due to pyloric obstruction and the consequent dilatation. When due to this cause, the amount vomited may be very large, and consist of quantities of undigested food which has undergone fermentative changes owing to the absence of hydrochloric acid.

When the holding capacity of the organ has become greatly diminished, vomiting may be entirely absent or occur in small quantities at short intervals. The vomited matter may be very offensive when pieces of the disease have become necrosed and separated, or a fistulous opening has occurred between the stomach and the lower bowel. There may also be an entire absence of free hydrochloric acid and the presence of lactic acid in the stomach, facts which greatly help in the diagnosis of malignant disease, in some doubtful cases.

Hæmatemesis is not so severe as in gastric ulcer, and is not produced by the over-distension of the organ with blood. In some cases, it may be entirely absent, and the occurrence of internal bleeding can only be recognised by the characteristic stools.

Hæmatemesis is seldom the cause of death in malignant disease of the stomach, but the repeated

small hæmorrhages, which so often occur in the course of this disease, most certainly hasten the end.

(g) CHRONIC DILATATION OF THE STOMACH.

This may be Obstructive or Non-obstructive. Obstructive dilatation is mostly met with in cases of stricture of the pylorus or duodenum, resulting from adhesions, malignant disease, or cicatrices. The passage of food from the stomach to the small intestine being delayed, the organ is forced to accommodate more than it can conveniently hold, and the muscular walls gradually give way under the pressure exerted by the gastric contents. This pressure being continuous, the muscular tissue is not permitted to regain its former tone and the organ, instead of returning to its normal size, remains permanently enlarged.

Non-obstructive dilatation is found where the stomach has been continually overtaxed in its efforts to digest repeated heavy meals, or when an injudicious diet has been indulged in for a long time, when the organ is in a myasthenic condition.

The gastric functions are greatly altered in chronic dilatation, for besides the great increase in size of the organ, its walls become very thin owing to their continued stretching. Atrophic changes may occur in the glandular structures, which are then replaced by fibrous tissue, resulting in a diminution of the total amount of gastric juice secreted. The percentage of hydrochloric acid secreted differs according to the cause of the dilatation. When due to malignant disease,

chronic gastritis, or myasthesia, there may be a deficiency, or an entire absence, of the acid from the gastric juice, but when due to irritation there is usually an increase.

Symptoms.—The process of dilatation being one which takes place gradually, the symptoms are also slow in making their appearance. Thus, the subject may for some time complain of slight pain, discomfort, or a feeling of fulness after meals, or there may be vomiting with frequent attacks of pyrosis, flatulence, and acidity.

As the dilatation advances and the atonic condition becomes more pronounced, fermentative changes may take place in the gastric contents, owing to the inability of the organ to empty itself. This is more marked in those cases where the dilatation is due to malignant disease, in which the hydrochloric acid is deficient or entirely absent. Later, vomiting becomes a constant symptom and occurs very irregularly, seeming to have no connection, as to time, with the food already taken. With little or no exertion, on the part of the patient, as much as six pints, or more, may be ejected from the stomach, which, when examined, is often found to contain particles of food which have been eaten some days before. Owing to the pressure on the surrounding organs, caused by the enlarged stomach, attacks of neuralgia, palpitation, dyspnoea, and fatal syncope are liable to occur. Thirst is a most distressing symptom in a great number of cases, and great difficulty may be

experienced in preventing the patient from drinking large quantities of water in the hope of satisfying it. The bowels are mostly constipated, but diarrhœa may supervene when fermentative changes extend to the intestines. Owing to the malassimilation of the food, the patient loses flesh and becomes anæmic. Death finally takes place from exhaustion or an intercurrent disease.

CHAPTER III.

ANÆMIA.

SINCE the various digestive media of the body are produced from the blood, it is essential that this fluid should be in a healthy condition itself before the juices can be properly secreted.

The greatest alterations in the consistency of the digestive fluids may occur in persons suffering from Anæmia, a disease in which one or more of the constituents of the blood are at fault. Hence the quantity may be deficient; there may be a diminution in the number of red corpuscles; the amount of colouring matter may be below normal; and the quantity of albuminous constituents may be reduced.

This condition of the blood may be said to exist in a Primary and Secondary form—that is to say, in the primary when no definite lesion can be found to account for the blood alterations, and in the secondary where some disease or condition of the body is evidently producing it.

Primary anæmia therefore embraces chlorosis, or green sickness, a disease so often met with in young subjects about the age of puberty, in which the amount

of hæmoglobin in each individual corpuscle is below normal, and pernicious or idiopathic anæmia, in which the red corpuscles are greatly diminished in number, but the hæmoglobin in each individual corpuscle is increased. The latter, being a rare disease in comparison to the former, will not be dealt with further.

Secondary, or symptomatic anæmia, may be the result of severe hæmorrhages arising from various sources, including epistaxis, hæmatemesis, hæmoptysis, menorrhagia, and metrorrhagia, &c. It may also accompany many chronic diseases, such as phthisis, malignant and Bright's disease, chronic discharges, and poisoning from various sources. It also occurs during acute illnesses, such as rheumatism, pneumonia, pleurisy, typhoid, and the other fevers.

CONDITIONS OF THE BLOOD IN ANÆMIA.

It is a disputed point whether the quantity of the blood is diminished in subjects suffering from anæmia, but, whether the quantity is reduced or not, it is the quality which mostly interests us in the diagnosis and subsequent treatment of the disease.

If a specimen of blood, taken from the ear of an anæmic subject, be examined, it will be found to be paler and thinner than that taken from a person in good health. When allowed to stand, coagulation will be seen to take place slowly, and in severe cases hardly at all. By the aid of a microscope various bodies can be seen in the field. These consist of numbers of red corpuscles, together with cells resembling them in shape

but of a much smaller size, which, on this account, have been called microcytes. Although not so commonly seen as in pernicious anæmia, large corpuscles termed megalocytes may occur in the specimen of blood of simple anæmia. As well as these two varieties, there is a third kind of corpuscle which is very constant in all anæmias, in which the number of red cells is deficient. These are termed poikilocytes, and appear in great numbers in chlorosis, and secondary anæmia, due to severe hæmorrhages. The red corpuscles will also be observed not to form the peculiar rouleaux, which they always do when the blood is in a normal condition. The white corpuscles are, in most cases, unaltered.

For a further examination of the blood two specially devised instruments will be necessary. One, termed the hæmacytometer, used for estimating the exact number of red corpuscles in a given specimen, and the other, called a hæmaglobinometer, for the purpose of estimating the amount of colouring matter contained in the same specimen. The results obtained by the aid of these instruments are compared with those obtained from healthy blood, when the deficiency of red corpuscles and hæmoglobin may be easily ascertained.

Symptoms.—These vary considerably, according to the severity of the disease. Some slight cases continue for years without apparently producing any, but, when the anæmia is of a pronounced type, some, or a com-

bination of the following signs and symptoms are usually present :—

Thus, the skin may be white, pale, or of an unhealthy, earthy looking nature. The visible mucous membranes lose their natural colour, and appear bloodless. The sclerotics assume a peculiar transparent blue in place of their pearly white coloration. The subject appears dull and apathetic, taking very little interest in what is going on around her. Attacks of fainting may be occasioned on the slightest exertion, which also causes great loss of breath with pulsation of the blood-vessels. Headache, of a more or less severe type, is complained of, together with dark spots appearing in the field of vision. The digestive system is usually affected early in the course of the disease, and great difficulty may be experienced in persuading the patient to take even the smallest quantity of solid food on account of the distressing symptoms which are produced. Various forms of neuralgia are also met with and occur in any situation, one peculiar form being that which affects the region of the stomach, having no relation to the ingestion of food. The pain so produced is of a paroxysmal nature, which at times is severe enough to produce symptoms of collapse.

In marked anæmia, the alterations arising in the composition of the blood affect the heart and blood-vessels to the same extent as the other tissues of the body. The patient is thus predisposed to attacks of syncope, palpitation, hot flushes with visible pulsations of the vessels of the neck. If the heart be now auscul-

tated, various murmurs may be heard over the præcordial area, which are likely to be confounded with those of chronic valvular disease, especially when œdema of the limbs is also present. When this occurs, the diagnosis may be very difficult, and more so if a definite history of rheumatism is obtainable. Constipation is present in the majority of cases, and usually constitutes one of the most obstinate symptoms to treat. The urine is variable.

Diagnosis.—From the many symptoms which are produced by anæmia, it is not very difficult to recognise the disease when it occurs, but a clinical examination of the blood will have to be made in order to exclude other forms of the disease, such as pernicious anæmia and leucocythemia. When this has been satisfactorily done, the next point to be considered is what the primary cause of the condition may be. This will necessitate a thorough examination of the patient, and the fullest consideration of all the symptoms complained of. When murmurs exist about the region of the heart, it must be determined as to whether these are due to chronic valvular disease, or to the anæmic state of the blood. In distinguishing the former, the history will have to guide us to a great extent. Thus, if the patient has had rheumatism, scarlet fever, or chorea, and the lesion is confined to certain valves, it is more than probable that the case is one of chronic valvular disease with secondary anæmia, but, if no history of these diseases be obtainable, and the murmurs

improve under appropriate treatment, the likelihood is that we are dealing with a case of anæmia, primary to the heart disturbances.

Treatment.—The initial step, to be taken in this direction, must greatly depend on the cause of the anæmia with which we are dealing, together with its degree of severity. If secondary, the attention must be directed principally to the cause, so that this may be removed as soon as possible. The patient should then be placed under the most favourable hygienic conditions obtainable. If not contra-indicated by the condition of the heart, tepid sea-water baths should be taken every morning, followed by a short, sharp, rub down with a towel of mediumly hard texture. The body should be warmly but lightly clothed, and regular daily exercise should be taken in the fresh air and sunlight, but on no account must this occasion the patient fatigue. The diet must be chosen according to the subject's powers of digestion, and should consist of a variety of foods, which are both easily digestible and nourishing, being at the same time selected from the patient's choice dishes.

In pronounced cases, exhibiting heart symptoms, the patient should be ordered absolute rest in bed, either in the house or in the open air, if the weather be fine and warm. The diet should consist principally of fluid foods until the condition of the heart has improved, when more solid foods may be substituted.

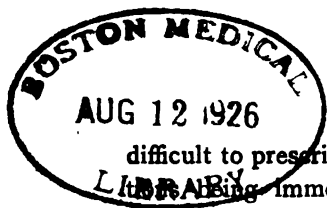
Massage, properly undertaken by a competent person,

may prove very beneficial in this stage of anæmia, both on account of its influence on the blood and lymph flow through the body, and its power of producing natural sleep.

As regards the medicinal treatment of anæmia, iron is without a doubt the most useful drug at our disposal, and, although in itself it constitutes a gastric irritant, its preparations are so numerous that whatever state the digestive organs may be in, some form or other can be prescribed which will be suitable to the case.

The choice of the preparation must therefore depend on the state of the digestive organs. If these be in a weak state, it is usually best to wait until some improvement has occurred, under appropriate treatment, before prescribing the metal. The least astringent preparations, such as the *Mistura ferri aromatica*, *Mistura ferri comp.*, may then be given, or a stronger preparation if such can be borne. When constipation forms a prominent symptom, a mixture containing sulphate of iron, sulphate of magnesia, diluted sulphuric acid, may be effectual, or a pill containing iron, together with a purgative drug when this form of administration is preferred. The addition of small quantities of arsenic to the treatment often meets with good results, and, in cases complicated with skin eruptions, the metal may prove very beneficial.

In obstinate cases of anæmia, where the disease has existed for some time, and the subject has become dissatisfied with her slow rate of recovery, it is often most



difficult to prescribe a preparation of iron without objection being immediately raised, on the part of the patient, that she is unable to take any form of the metal without being subjected to distressing gastric symptoms.

In this class of case, I have found the alginate of iron most useful. This preparation, whose chemical formula is given as $C_{17}H_{17}Fe_4N_2O_{22}$, contains nearly 11 per cent. of metallic iron, and is obtained by decomposing chloride of iron, in solution, with a solution of alginate of sodium. It exists as an insoluble, brown, tasteless powder, which imparts a slightly gritty sensation to the teeth.

Being slightly soluble in ammonia, it can be prescribed in the form of a mixture, but, for convenience, it is best given in cachets, pills, tablets, or, in the case of children, in powder, which can be easily placed on the tongue.

It is practically unaltered by the action of the gastric juice, and leaves the stomach, to enter the small intestine, without giving rise to gastric discomfort. Having a slightly laxative action on the intestine, this preparation can, in many cases, be prescribed without the addition of a purgative.

Its usual dosage is from 2 to 10 grains, given three times a day, which is improved by the addition of small quantities of arseniate of sodium.

Changing the form of iron from time to time as well as its mode of administration may, in a certain number of cases, hasten recovery, and should certainly be tried

when the course is an extended one. On account of the decomposing properties which iron possesses on the gastric juice, both, when given in excess, or when the hydrochloric acid is deficient in the stomach, all preparations of the metal should be given after food. Tea should also be withheld during a course of iron treatment, on account of the incompatibility of tannin with the per salts of the metal.

Time perhaps is the most important factor in the treatment of anæmia, and, on this account, patients are sometimes apt to become dissatisfied with their slow recovery; therefore, before undertaking to treat a case of pronounced anæmia, it is always advisable to over-estimate the time taken for recovery than otherwise.

CHAPTER IV.

CONSTIPATION.

THE serious alterations, which may arise in the digestive system from the indiscriminate use of purgatives for the relief of temporary or habitual constipation, have made me consider that a few simple remarks on this subject will not seem out of place.

Nature has demonstrated that, unless the waste products of the body be not regularly eliminated, the functions of the digestive organs become lowered in consequence of re-absorption taking place, and the subsequent changes in the composition of the blood. This elimination must, however, be effected naturally, as otherwise the tone of the intestinal muscular tissue becomes lessened, or lost, and the bowels unable to act unless further stimulated by artificial means.

Since the treatment of constipation resolves itself, in the majority of cases, into removing the cause, or causes, of the complaint, it will be necessary to understand what these causes may be due to.

For the purpose of convenience, the causes of constipation are usually classified according to whether they be local or general.

The principal LOCAL causes constitute :—

- (a) Feeble contraction of the muscular coats of the intestine.
- (b) Accumulation of waste products of digestion in the lower bowel.
- (c) Constriction of the gut.
- (d) Pressure on the gut caused by any abdominal tumour which may come in contact with it.
- (e) Pain, originating from disease, or condition of the lower bowel—*i.e.*, fissure, fistula, hæmorrhoids, &c.. &c.
- (f) Spasm of the sphincter ani muscle.
- (g) Lax condition of the abdominal walls.

The principal GENERAL causes are associated with certain diseases :—

- (1) Anæmia, gout, rheumatism, diabetes.
- (2) Diseases of the heart, liver, kidneys, stomach, intestines, nervous system, &c., and
- (3) Certain habits, including disinclination to take sufficient exercise ; the continued use of harmful purgatives for the relief of constipation ; too great mental activity, especially of a worrying nature ; the continued use of too rich and unvaried foodstuffs ; disregard to perform the act of defæcation when called upon by nature ; the abuse of alcohol, tea, and tobacco.

Although many of these causes appear to be most trivial, it is astonishing to find how often they are allowed to continue for years unheeded.

Treatment.—The main point in the treatment of constipation is to thoroughly recognise the cause of the condition before attempting to relieve the symptoms. For this purpose, a complete examination of the patient must be made, and his mode of living and habits ascertained, as it is only by this method that a clear diagnosis can be made. When the trouble is due to some local cause, the diagnosis may, however, prove extremely difficult. Happily, this class of case is not very common, and our attention is mostly directed towards a more simple cause. When due to anæmia, gout, rheumatism, or any other disease, an appropriate treatment suitable to the individual disorder must be prescribed.

Since the natural action of the bowels depends upon a sufficient supply of suitable food, together with a healthy condition of the intestines, any injurious habit which prevents these factors from existing must be dealt with.

The diet should therefore be a varied one, and contain a fair proportion of vegetable food, such as lettuce, spinach, watercress, and salads made with olive oil. Brown is preferable to white bread, and porridge made with oatmeal should be prescribed when not contra-indicated by the state of the digestive organs. Ripe fruits, when in season, or dried fruits stewed in

olive oil, should form part of the patient's daily food, and are best taken immediately on rising. Coffee should be taken in preference to tea, the latter having a tendency to constipate owing to its astringent action on the bowels. In cases where the circulation is enfeebled, either from disease or other cause, the addition of a small quantity of alcohol to the patient's diet may prove beneficial by increasing the flow of the intestinal secretions, but the amount given must depend entirely on the age of the patient, together with his habits and idiosyncracies. Sometimes a glass of cold water taken just before retiring at night, or the first thing on awakening, has the desired effect, and in some instances will ensure a regular evacuation of the bowels.

A regular daily visit to stool must be insisted on at a time when there can be no possibility of the act being hurried or interfered with. Although there may be no immediate desire to defæcate at the time chosen, this course should be persevered in, and the muscular efforts made and continued for some minutes, just as if the desire were present. If no satisfactory result be obtained after the second or third day, an enema consisting of cold water may then be used, but this should in no way be larger than that necessary for the clearance of the lower bowel. If, however, an accumulation extending up the descending colon exists, a much larger enema will be required for its removal.

The patient should be encouraged to rise early, and, if not contra-indicated by feeble circulation, to take a

cold bath followed by sharp friction effected with a hard towel. Douches, directed upon the abdomen, together with massage along the course of the colon, may prove useful by assisting the intestine in getting rid of its contents, and by improving the tone of the intestinal muscular walls. Regular daily exercise must also be undertaken, but its form and duration must depend greatly on the ability and physical development of the subject. Whichever form of exercise is chosen, it should be performed in the open air, and for this reason the popular use of dumb-bells in the bedroom should be discouraged, as, by this means, the lungs become filled with air already rendered impure by the products of respiration during sleep. Sports of a violent nature, and producing much perspiration and excitement, should be forbidden. When the abdominal muscles are found to be at fault, carefully regulated exercises taken on the horizontal bar, or other gymnastic apparatus, may prove useful in restoring their lost tone. If the subject is one whose occupation necessitates great mental application, this should be undertaken in a standing position and, when possible, walking about the room. The use of purgatives, especially those of a drastic nature, should be forbidden, unless ordered for a purpose by someone in authority.

If the above course fails to give relief, medicinal treatment must then be added to it. When this is so, such drugs as will increase the secretions and peristaltic action of the intestinal muscular wall, and at the same

time, add tone to the system generally, must be employed.

For this purpose, an aperient suitable to the case should be chosen, and combined with such quantities of a nervine tonic that, although the purgative exercises a depressant effect on the bowel, this is more than counteracted by the action of the tonic drugs, which also adds tone to the intestinal muscular tissue.

When employing a purgative drug, the following simple rules must be closely observed :—

- (a) The dose of the drug should not be greater than that necessary to effect a clearance of the lower bowel.
- (b) The purgative should be administered in such a way as will not distress the patient who takes it.
- (c) If more than one evacuation of the bowels is produced during twenty-four hours, the drug must be withheld or the dose diminished during the next day.
- (d) Never purge the bowels, as by so doing one of the causes of constipation will be given rise to.

A great variety of purgatives have been employed, either alone or in combination with one another, in the treatment of constipation. Amongst the commonest of these are castor oil, compound liquorice powder, rhubarb, aloes, cascara sagrada, confection of senna and sulphur, podophyllum, &c.

As to the question of which is the best drug to employ, this must depend entirely on the case and the idiosyncracies of the patient. In children, castor oil seems to be the safest, and can be given either in the liquid form, or enclosed in capsules, if the child be old enough. It is also useful when a slight laxative action of the bowels is wished for, or when other forms of purgatives produce griping. If a more decided effect on the bowels is required, such drugs as aloes, cascara sagrada, senna, or liquorice must be employed, but these only in adult cases. A very convenient form of pill is that containing aloin, jalapin, podophyllin, ginger, and the extracts of hyoscyamus and nux vomica, in which the amounts of the various ingredients should be varied from time to time, according to the effects produced. The purgative elements of the pill should be gradually lessened as the bowels become more regular in their action, and finally dropped when a regular daily evacuation has been obtained by their use. This procedure must not, however, be effected too hurriedly, but must be allowed to extend over a considerable period of time, and the tonic elements of the pill continued for some months after this.

In those cases where the treatment is prolonged, much more satisfactory results are obtained by changing the aperient from time to time, as well as the way in which it is administered.

A very important point in the treatment is, at what time the aperient is best given. This, of course, must entirely depend upon the rapidity of its action in

the individual case, and the dose in which it is given. If its effects are required immediately after breakfast, the drug must be given the night before in such amounts as will be sufficient, with the aid of the patient's efforts, to effect this at the time desired, but since different drugs have never the same effects on two individuals alike, the time for their administration can only be successfully given after the idiosyncracies of the patient have been ascertained.

As soon as the bowels have returned to their former natural tone, strict attention must be paid to the few simple points of hygiene and diet mentioned above.

CHAPTER V.

TREATMENT OF INDIGESTION.

IN all cases of indigestion, it is essential that the primary cause of the digestive failure should be fully recognised, and removed, before any treatment of the digestive tract itself can be undertaken with any hopes of success.

Therefore, in dealing with a case of indigestion, it will be necessary to obtain some definite knowledge of the gastric functions, for, since the symptoms resemble one another so closely, it may be very difficult in many cases to diagnose the primary cause without this.

From various experiments, which have taken place from time to time, we are now in a position to estimate how long certain substances, used as food stuffs, remain in the healthy stomach before becoming completely digested. When given in specified quantities, these substances are used to constitute what is called a test meal, and it is from the results obtained by examining portions of this meal, at various periods of digestion, that we are able to estimate how far and in what direction the functions of the stomach deviate from normal.

Many test meals have been devised, but that used by Leubé, consisting of a small quantity of soup, five ounces of beef steak, and two or three ounces of bread, seems to meet most requirements, for by its use we are able to recognise, besides other conditions of the stomach, those in which prolonged activity of the organ is absent.

Thus, given that the stomach be healthy, and is afforded every facility for performing its functions naturally, a portion of the gastric contents is drawn off with the aid of a stomach tube and pump about three hours after the introduction of the test meal. The bulk of the material, so obtained, will then be found to consist of hydrochloric acid, peptones, and proteid material undergoing digestive changes, and, if the tube be re-introduced in two or three hours after this, the stomach will be found to be empty, thus showing that the gastric digestion has been completed.

Any notable deviations from these results will necessarily denote alterations in the normal gastric functions. For instance, a diminution in the quantity of hydrochloric acid occurs in atony, malignant disease or chronic gastric inflammation. An increase in this acid secretion is mostly due to irritation of the gastric walls, resulting from imperfect mastication, gastric ulcer, &c. An excess of gastric mucus is found in chronic gastritis, whilst the presence of undigested material, long after the time occupied for normal digestion has passed, may denote atony, dilatation, or obstruction. Pus, if present, may be primarily due to oral sepsis, or from being swallowed by those suffering from chronic bronchial troubles.

Test for the Absorptive Power of the Stomach.

The absorptive power of the stomach may be tested with the aid of potassium iodide. About three grains of the drug are given in a proteid envelope when, if the absorptive power of the organ be normal, iodine may be detected in the saliva in about ten or fifteen minutes after the drug has been first introduced. This test, however, is not reliable, and only a certain amount of knowledge can be derived from its use, for it does not follow, that because potassium iodide is speedily absorbed, all other substances will meet with a like treatment.

Test for the Mechanical Power of the Stomach.

Salol, *i.e.*, phenol ether of salicylic acid—is the drug used for this purpose. When in an alkaline medium, salol becomes converted into salicylic and carbolic acids, in the ratio of two parts of the former to one part of the latter.

About 15 grains of the drug, enclosed in a capsule, is given soon after the principal meal of the day. As soon as the capsule reaches the stomach, the proteid envelope becomes dissolved by the gastric juice, and the contents, which are thus liberated, pass on to the duodenum, where they are converted into their component parts by the alkaline pancreatic juice. Taking for granted that the pancreas, kidneys, and the absorbent properties of the intestines, be normal, the salicyluric acid reaction can be obtained with ferric chloride if the urine be tested about an hour, or an hour and a

half, after the drug has been first introduced into the body.

Having obtained a definite knowledge of the gastric functions by these methods, the primary causes can then be recognised and removed.

IMPROPER FEEDING.

(a) IMPERFECT MASTICATION.—A defective state of the teeth, or other condition of the mouth, preventing the act of mastication from being satisfactorily performed, being the primary cause in the majority of cases of digestive failure, the oral cavity and its contents should be thoroughly examined in every instance where the symptoms of indigestion present themselves. For, although imperfect mastication may not be the actual cause of the present trouble, the time will not be far distant when its effects will assert themselves, and produce far greater alterations in the gastric functions than those already existing.

If ulcers exist about the tongue, lips, or any part of the mouth, these must be dealt with according to their origin and requirements. Carious teeth should be carefully filled, or extracted, when the former proceeding is impossible, and any discharging sinus, or other condition rendering the saliva septic, treated according to its cause. If any teeth be absent, especially those used principally as grinders, these must be substituted by artificial ones, but the greatest care must be exercised to ensure that these be well fitting, as otherwise more harm than good may result

from the interference. Thus, ulceration of the gums, tongue, cheek, or lips may result from the chronic irritation produced by badly fitting teeth, and the subsequent pain, so produced, may lead to the patient refusing to wear those, or any other artificial means of mastication, for fear of a repetition of these results. Again, when the teeth are badly fitting, particles of food may entirely escape mastication, and so present themselves for gastric digestion in practically the same form as they entered the mouth.

After each meal, with the aid of a suitable wash, the mouth and teeth should be freed from any particles of food, which may become decomposed if allowed to remain, and, in order to prevent any dental deposits from occurring, an antiseptic tooth powder, preferably one not containing carbolic acid, should be used both night and morning.

When cleaning the teeth, the subject should be warned not to rub them from side to side, but to use the tooth brush in such a manner that the bristles pass over the upper set from above downwards, and the lower from below upwards, thus ensuring the removal of any substances which may have become lodged in the interdental recesses, a result impossible to obtain otherwise.

(b) **IRREGULARITY OF MEALS.**—The habit of taking snatches of food at irregular intervals, instead of regular set meals, should be discouraged, as by this means the stomach is kept in a constant state of activity, and never allowed the rest which nature requires for it.

Four meals a day are usually sufficient for the ordinary business man, but these must be taken at regular fixed hours, which should be strictly adhered to. Thus a reasonable division of meal times may be made, viz. :—Breakfast, 8 a.m. ; lunch, 12.45 p.m. ; tea, 4.15 p.m. ; dinner, 8 p.m. During meal times all matters associated with business should be dropped, and the conversation turned to such topics as will afford a complete relaxation and recreation for the mind. A certain amount of rest before and after a meal is always beneficial, but feeding alone should not be advised, as, by doing so, one is apt to hurry, and so omit to masticate properly.

(c) UNSUITABLE FOODS.—Although certain foods have been classed as indigestible, either on account of their natural characters, or from the effects they produce on some individuals, it does not follow that these foods have the same effect on everyone alike. For this reason, it is never advisable to exclude any article of food from a person's diet without first making certain that it is really doing the individual harm, for, in many cases, a patient may be made to consider his condition much worse than it really is, by forbidding him to eat certain favourite dishes. When, however, it is recognised that one is indulging in foods which contain either an excess or a deficiency of proteid, carbo-hydrate, or fatty materials, an interference must certainly be made.

ALTERATIONS IN THE GASTRIC FUNCTIONS.

I. HYPERSECRETION.

The primary cause must first be sought for. Any factor, which may prevent the act of mastication from being properly performed, must be removed. The diet should consist of substances which cannot give rise to irritation of the stomach, and so composed as to include those elements which are essential for health. Tea, coffee, alcohol, sauces, and condiments, should be withheld, as well as certain fruits and vegetables. The meals should be taken regularly, and the food well masticated before being swallowed. Rest before and after a meal should be encouraged, as well as regular mild exercise in the open air. The medicinal treatment consists of giving alkalies in the hopes of neutralising the superfluous hydrochloric acid, and a mixture such as one containing carbonate of bismuth gr. x., bicarbonate of soda gr. xv., compound tragacanth powder gr. v., dilute hydrocyanic acid ℥. ii., spirits of ammonia ℥. x., peppermint water to the ounce, may be given about half an hour after every meal, with the addition of phenacetin gr. vi., or bromide of potash gr. x., if painful contractions of the stomach occur. In those cases, where history of gout has been obtained, an alkaline mixture containing the salts of potassium, and lithium, and a suitable purgative, with the addition of small doses of hydrochloride of morphine, may meet with better results. Constipation should be treated according to its requirements. When the case is not far advanced, no further treatment may

be necessary; but a course of strict dieting, absolute rest in bed, and massage, may be required when the symptoms are very severe.

During convalescence, the patient must be cautioned to live regularly, and should be sent to a suitable bracing locality, where he can forget his former condition.

2. GASTRIC ATONY.

As this condition of the stomach is one which, in the majority of cases, accompanies a general neurasthenic state of the system, a course of treatment must be followed which will improve the general tone of the body. Fresh air, regular exercise, good nourishing food, nervine and gastric tonics should be prescribed. The use of alcohol must depend entirely on the former habits and present condition of the patient, and, when considered necessary, should be given in small quantities well diluted. Tobacco, especially when the smoke of which is inhaled, should be forbidden. Tepid sea-water baths, followed by general massage, usually give most beneficial results in cases of advanced and general muscular weakness, but whatever treatment is followed, it must be suited to the individual case and persevered with, as complete recovery is often very slow in making its appearance.

ALTERATIONS IN THE MUSCULAR COATS OF THE STOMACH.

(1) ACUTE GASTRITIS.

When the cause is due to gastric irritation, the stomach should be emptied as soon as possible, either

by an emetic or a hypodermic injection of apomorphine, but if nature has already done so, this will not be required. If the case be seen after sufficient time has elapsed for the stomach to empty its contents into the duodenum, a dose of castor oil may be advantageously prescribed to hasten the expulsion of the irritating material from the intestines. Shock should be met by warmth and stimulants, the latter given either by the mouth or injected hypodermically.

Although the symptoms of acute gastritis usually subside after the cause has been removed, further treatment may be required in those cases where this is not so.

Therefore, in severe cases where the vomiting continues directly anything enters the stomach, complete rest must be ordered. The patient should be put to bed and nutrient enemata resorted to, nothing whatever being allowed to enter the stomach by way of the mouth. Gastric pain should be met by hot fomentations applied over the region of the stomach, and, if severe, by hypodermic injections of morphine.

In milder cases, the diet should principally consist of milk, to which has been added a little lime or soda water, varied occasionally by the addition of beef tea or Valentine's Meat Juice. These are best given in small quantities at short intervals, as otherwise vomiting may be occasioned or the inclination increased if already existing. Thirst is best relieved by allowing the patient to suck small pieces of ice. Effervescing mixtures, or bismuth in the form of the salicylate, may

prove useful by counteracting the acidity, and lessening the tendency to vomiting.

As the inflammation subsides, so must the diet be cautiously made more liberal. This should be done by thickening the milk with powdered rice or biscuit, and allowing the patient such articles of food as egg and milk, custard, tapioca and sago puddings, toasted stale bread. When these are well borne without giving rise to further symptoms, small quantities of fish, chicken, and mutton, may then be cautiously tried, and so on until the ordinary diet has again been arrived at.

(2) CHRONIC GASTRITIS.

In this affection of the stomach, occurring as it does from such vastly different causes, no improvement must be expected until after its primary cause has been successfully removed.

When this has been done, fresh air, exercise, definite occupation, and, above all, regularity of meals, should be insisted on.

The diet must be suited to the occupation of the individual, bearing in mind that a person following a sedentary life is not so capable of digesting nitrogenous foods as one who is actively employed. The meals should consist of substances which are both varied and easily digestible, and selected so that they may contain those principles which are necessary for maintaining health. Tea, coffee, alcohol, and other gastric irritants, should be forbidden, or allowed in such quantities as may be borne with no ill effects in the individual case.

The form, and amount of exercise prescribed, must depend entirely on the ability and physical strength of the patient, and no rule should be laid down in this direction, but must be made to suit the case. In those cases where entire rest has been ordered, massage may prove very useful, both by encouraging the circulation of the blood, and lymph, and by improving the general tone of the nervous system. Special attention must be given to the bowels, which are best relieved by such purgatives as the sulphate of magnesia, the effervescing sulphate of soda, or one of the many natural mineral waters, but, whichever purgative is chosen, it must not be employed long enough or in such doses as will further lower the muscular tone of the digestive system. In some cases, especially where the secretion of mucus is excessive, washing out the stomach will give beneficial results.

As our object is to improve the general health of the patient, the mineral acids, combined with strychnine and a vegetable bitter, should be prescribed as soon as the stomach is in a condition to tolerate them.

(3) GASTRIC ULCER.

Since many symptoms of gastric ulcer so closely resemble those due to other diseases of the stomach, the actual diagnosis of this condition may be extremely difficult, or impossible to make with any certainty, until an attack of hæmatemesis, which cannot be due to any other cause than ulceration, makes its appearance. From the nature of the disease, the chief objects of

the treatment must be to obtain as much rest for the organ as possible, and at the same time alleviate the symptoms as they arise. Therefore, if the symptoms be acute, the patient should be ordered to take absolute rest in bed, and not allowed to exert himself under any consideration whatever. Nothing must be permitted to enter the stomach by way of the mouth, but rectal feeding entirely resorted to.

Hæmatemesis must be met by hypodermic injections of morphine, and ice-bags applied over the epigastrium. If the hæmorrhage be severe enough to cause collapse, twenty or thirty ounces of saline solution—*i.e.*, one drachm of sodium chloride in twenty ounces of water at 100° F.—should be injected subcutaneously. The bowels should be regulated by soap and water enemata.

When the symptoms become less acute, rectal feeding may be discontinued, and the diet made to consist principally of milk, to which may be added with advantage a small quantity of lime-water. The feeds should be given in small quantities at short, regular intervals, and should be sipped, so that the chance of producing vomiting may be minimised. As an entirely milk diet is often distasteful to the patient, an agreeable change may be made by substituting for this such articles as Valentine's Meat Juice, simple beef jelly, or scraped raw meat, two or three times a day.

To further help the gastric mucous membrane in its recovery, a mixture containing carbonate of bismuth, bicarbonate of soda, compound tragacanth

powder, dilute hydrocyanic acid and peppermint water may be given three times a day fifteen minutes before the principal feeds of the day, adding a few minims of liq. morphinæ hydrochloridi or liq. strychninæ hydrochloridi, according to the case. The bowels are best relieved by castor oil, liquorice powder, or a small dose of one of the natural aperient waters, according to the taste of the patient.

When this form of treatment has been borne for some time, without occasioning any return of the symptoms, the patient may be allowed to sit up and his diet made more solid by thickening the milk with powdered rice or biscuit, at the same time increasing the quantity of nourishment taken at each meal. If the conditions still remain favourable, bread and milk may be allowed, and later, boiled fish, small quantities of chicken, stale bread with butter, milk pudding, and so on, until he is, by degrees, again able to partake of his normal diet. Tea, coffee, alcohol, vegetables, and any substances which may irritate the stomach, must be rigorously excluded from the diet throughout the treatment. The subject of gastric ulcer should be warned to thoroughly masticate his food before swallowing it, for fear of converting those substances which are naturally easily digested, into gastric irritants by imperfect mastication. When in a fit condition, the removal to a bracing locality, followed by a judicious course of tonic treatment, will be most beneficial, and will tend to hasten the patient's ultimate recovery.

If at any time during this course, the initial symptoms of gastric ulcer recur, they must be treated in the same manner as if they had been entirely absent from the first.

The rapid advances made in the science of surgery during the past few years, have made the operation now performed for chronic gastric ulcer, an undertaking attended by the most satisfactory results, so much so, that patients who were formerly unable to take even the blandest of foods are able, after the operation, to eat with impunity substances which are of a most indigestible nature.

(4) CHRONIC DILATATION OF THE STOMACH.

In this condition we must endeavour to relieve the symptoms as they arise, and also help the stomach to return to its former state by removing, as effectually as possible, the primary cause giving rise to it. In mild cases, the diet should be of the plainest, but at the same time nutritious. Such articles as tea, coffee, and vegetables, should be forbidden, together with all meats of a fibrinous nature, and substances containing starch or sugar. As little fluid as possible should be taken with the meals, and nothing at all between times, excepting perhaps a small quantity of water, and this not until after two or three hours have elapsed from the last meal. The subject should be warned not to hurry through his food, but should be encouraged to rest before and after a meal. Besides removing the cause as far as possible, and placing the subject under

the most favourable hygienic conditions obtainable, little farther than this can be done in the way of treatment where the dilatation is but slight.

In pronounced cases, we must endeavour to relieve the symptoms as they arise. If the pain be severe and is accompanied by frequent vomiting, the patient must be fed entirely by rectal enemata until these symptoms subside. If the enlarged stomach causes distress, by exerting pressure on the neighbouring viscera, this may often be relieved by wearing a specially constructed belt which will support the organ. Great relief may also be obtained by periodically washing out the stomach, especially in those cases where pain results from the weight of its contents, and dyspnœa on account of its size. Acidity is best relieved by the bicarbonate of soda, or salicylate of bismuth, and such drugs as salol, carbolic acid, sulpho-carbolate of soda, and creosote, on account of their antiseptic properties, are most useful where the formation of flatus is excessive. Massage, either executed manually or by the means of electricity, may be employed with good results, as, by dislodging the flatus and increasing the blood flow and motility of the stomach, the amount of fermentation taking place in the organ is materially diminished.

The condition of the heart must be carefully watched in all cases of dilatation, and such cardiac tonics as digitalis, strychnine, ammonia, and alcohol, prescribed where indicated. The patient should be warned never to exert himself, or to indulge in any form of food other than that which has been planned out for his relief.

The medical treatment of obstructive dilatation resolves itself into relieving the symptoms as they arise, and is therefore the same in most respects as that employed for the non-obstructive condition. The further treatment is entirely surgical, and consists of various operations which are performed for the purpose of removing the obstruction in suitable places.

WASHING OUT THE STOMACH, *i.e.*, LAVAGE.

This operation, although giving excellent results in many gastric conditions, such as neurasthenia, chronic gastric catarrh, dilatation, and certain cases of acute inflammation, should not be undertaken if aortic aneurism, gastric ulcer, cardiac disease, or malignant ulceration exist, unless under exceptional circumstances. Its object is to remove the contents of the stomach when sufficient time has elapsed for gastric digestion to become completed.

The operation may be done with the ordinary stomach pump, or a gum elastic tube, the latter, although not so complete as the former, has the advantage of the patient being able to manipulate it for himself. If the elastic stomach tube be chosen, it should not be less than 25 inches in length, and should be connected at its free end with a glass funnel by means of an india-rubber tube measuring from three to four feet in length.

The subject should be placed in a comfortable sitting position, with a small bath, or pail, resting on his knees

to receive the washings of the stomach. The gum elastic tube, having first been lubricated with a small quantity of oil, is then passed well to the back of the pharynx, where, by the act of swallowing on the part of the patient, it can be made to enter the stomach without much difficulty. Having introduced the tube, the funnel is then raised about a foot above the patient's head, and a small quantity of water poured into it. Before, however, all the water has had time to enter the tubing, the funnel is suddenly inverted over the pail, thus producing a syphonic action, by means of which the contents of the stomach are withdrawn. The organ having been emptied in this manner, a pint or two of a 20 per cent. solution of bicarbonate of soda is then introduced into it, but before all of the solution has left the funnel, the india-rubber tubing is compressed between the fingers, so that when the apparatus is inverted and lowered the solution is again withdrawn. This process is repeated with plain warm water until the washings of the stomach return quite clear.

The operation of washing out the stomach should not be performed more often than once a day, an hour before the largest meal of the day being the best time to make it.

MASSAGE.

The effect of massage is one of stimulation produced at the expense of the masseur, by which the system is eventually enabled to perform its natural

functions unaided, provided, however, that no organic disease exists to prevent this.

The manipulations which constitute massage, or medical rubbing, have been divided into four classes—*i.e.* :—

- (1) Effleurage, consisting of light stroking movements, usually effected by the finger tips of the operator.
- (2) Petrissage, or pressure, produced by squeezing, kneading, pinching.
- (3) Tapotement, or tapping, including vibratory, pounding, and percussion movements, and
- (4) Friction.

All these series can be executed by the hands of the operator alone, but certain movements, such as vibratory, can also be undertaken with the aid of specially constructed electrical instruments.

In cases of indigestion arising from a loss of nervous tone (and therefore accompanied by derangements of the muscular, vascular and glandular systems), massage may be met by very beneficial results for the following reasons :—

- (a) By its proper employment, the circulation of the blood, lymph, and chyle, through the body, is mechanically increased and congestion decreased.
- (b) This increase of the circulation produces a

greater blood supply to the various nervous centres, and therefore an improvement in the tone of the general nervous system.

- (c) By mechanically increasing the blood flow through the body, the period of rest obtained by the heart is lengthened, thus allowing the muscular fibres of the organ an opportunity of regaining their lost tone.
- (d) It stimulates, and ultimately restores, the glandular activity by which the various secretions are produced in normal quantities, and the waste products of the body are eliminated.
- (e) By improving the condition of their blood and nerve supply, the activity of the voluntary and involuntary muscular fibres is increased.

The effects of general massage should therefore prove beneficial in certain cases of constipation, anæmia, chronic gastritis, chronic dilatation, and functional disorders of the stomach.

When this treatment has been decided upon, the patient should be placed on his back on a comfortable couch, so constructed, that whilst most of his weight rests on the shoulders and buttocks, his position can be altered in such a manner as requires the least exertion. With the body warmly clad, and the head supported by comfortable pillows, the left upper limb is then bared and its muscles brought to a state of relaxation. With his hands lubricated with a suitable material, the operator now commences at the digital extremities and

makes rapid light friction movements in a direction towards the trunk, both on the palmar and dorsal surfaces of the limb. Having flexed and extended each joint two or three times, the muscles are then subjected to vibratory movements, made either by the hands or by the vibrator, in the same direction as before. Having operated in this manner for about three minutes, the limb is covered up and that of the other side manipulated in the same manner for a like period of time, and finally covered up.

Massage of the lower extremities is effected by the same movements, made in an upward direction in the course of the venous flow.

MASSAGE OF THE ABDOMEN.

Before operating on the abdomen, however, the masseur must satisfy himself that the patient's bladder is empty, and that he is resting in such a position as will not necessitate unnecessary muscular contraction. Then, with the knees flexed upon the abdomen, and the patient breathing through his mouth, the attention should be attracted from what is occurring, so that the abdominal muscles may become fully relaxed. When this is so, the abdomen may be lightly stroked, for a short time, with the finger tips, in a direction taken by the contents of the large intestine, *i.e.*, from the right iliac fossa upwards to the under surface of the right lobe of the liver, then transversely across the abdomen to the left hypochondriac region, thence down to the left iliac fossa. After a few minutes, the manipulations

are then made more definite by placing the palm of the left hand on the right side of the abdomen, and that of the right hand on its left side, and with the thumbs of both hands pointing inwards, making regular, slow pressure with these along the course of the large intestine. Having operated in this manner for about five minutes, the small intestines should then be also masséed by subjecting them to the various squeezing, kneading, and vibratory movements, but always taking care to work as much as possible in the same direction as that given above, *i.e.*, the intestinal flow.

The vibratory movements may be conveniently undertaken with the aid of an electrical vibrator. The advantages of this form of administration are, that the operator has complete control over his instrument, and can with the greatest ease vary the rapidity and strength of the vibrations, and the depth to which they exert their influence.

MASSAGE OF THE BACK.

The patient should now be turned over, so that he rests on his knees, abdomen, and chest, having the arms extended in front of him and the region, from the shoulders to the buttocks, uncovered. With the flats of the hands, the skin over this region is then brushed with quick, light stroking movements until its temperature is slightly raised. Next, with the tips of the fingers on the intercostal spaces and ribs, and the thumbs resting on the spinous processes, the back and sides of the chest are subjected to short, sharp, petris-

sage movements made in the direction of the intercostal vessels, and followed round to the sternum. The manipulations now commence at the lower part of the back, and consist of movements made with the carpal portions of the thenar and hypothenar eminences. These are usually effected by making the fingers act as advancing points, and dragging the heel of the hand after them by a series of jerky movements, as they advance towards the shoulders. The same manipulations are alternately undertaken in the opposite direction, until this region has been traversed about a dozen times altogether. The last part of the operation consists of vibrating the whole of this area, commencing first with rapid, light vibrations and gradually diminishing the rapidity and increasing the force of each percussion.

MASSAGE OF THE LOWER EXTREMITIES.

This is done in practically the same manner as that used for the arms. The toe joints are flexed and extended alternately, and the interosseous spaces subjected to petrissage manipulations made in the direction of the venous circulation. The ankle joint is next flexed, and extended, and the foot inverted and everted. The leg and thigh are then subjected to exactly the same treatment as that used for the upper extremities.

ELECTRICITY.

Although electricity has, for many years, been utilised in the treatment of disease, it has not been until comparatively recent times that any progressive and scientific studies of its properties have been made. When used with caution, as when in the hands of properly qualified medical men, electricity becomes a most useful and beneficial adjunct in the treatment of many morbid conditions of the human body ; but when, as so often happens, it is administered by those whose knowledge of disease is limited to the spelling of a few technical terms, then electricity becomes, and is, a most dangerous plaything.

The effects of electricity on the human subject are many, and vary according to the manner in which it is produced, and administered.

Speaking generally, electricity produces stimulating effects on the entire nervous system, and, therefore, increases, and regulates, the activity of every organ of the body. This being so, it should hold an important part in the treatment of conditions producing changes in the digestive system, and this it does.

The two currents, used principally in medicine, are those termed direct and interrupted, the latter, producing stimulating and trophic effects, being the one mostly employed.

One of the simplest and most convenient methods of administering electricity is by means of the bath.

THE HYDRO-ELECTRIC BATH.

The great advantage obtained by this mode of application is, that the whole of the body is subjected to the effects of electricity at the same time.

The best kind of bath to use is one made of porcelain, which is a di-electric. This should be placed in such a position as to ensure it being free from any metal pipes, or other conductors, which may be connected to earth. It should, therefore, be filled and emptied by means of an india-rubber pipe, which can be removed when not in use. The water should be kept at such a temperature as best suits the comfort of the patient. At each end of the bath is placed a large metal electrode, which is connected by a conducting wire to the apparatus from which the electricity is taken or generated. In order that the patient may not come in contact with the electrodes, a back and foot rest should be placed at both ends of the bath. These may consist of two wooden frames, across which have been stretched pieces of webbing, such as that used by upholsterers. The rests should fit across the sides of the bath, and should be removed and washed after every electrical application. Besides the foot and head electrodes, a third one is also used when the current is required to be concentrated over a special situation. This consists of a spade-shaped electrode, connected to the foot-plate by a convenient length of insulated conducting wire, which thus allows it to be moved about the bath at will, and the current to be concentrated over the region where it is most required.

The current used for a bath of this description, may be direct, faradic, galvano-faradic, or sinusoidal, according to the condition of the patient and the object of the application.

Another method of applying electricity generally is by means of the high potential, or high frequency current. Although this form of application is more convenient to administer than the hydro-electric bath, the results obtained by its use do not show that it possesses any superiority over the latter. The apparatus employed for its production is both complicated and costly, especially when the house current has to be transformed and rectified before it can be used for this purpose. For a full account of the high frequency current and the various modes of its application, I must refer the reader to a standard work on Medical Electricity.

When it is considered advisable to subject a patient to a course of electrical treatment, the sittings should be given on consecutive days for the first four or five times. After this, the patient should be told to attend on alternate days and should be subjected to twelve, or more, applications according to the benefit derived. About ten minutes' sitting should be given at a time, but this must be entirely regulated by the condition of the pulse and other means at our disposal. The amount of current passed through a patient taking an electric bath, should never be strong enough to cause any discomfort, and should always be tried on the operator himself before it is administered to the subject. To one accustomed to using electrical appliances this is an easy

matter, as by holding his hands far apart in the bath water, when the current is flowing, he can judge, with comparative certainty, how such a current will be borne, by his patient, or if it is too strong.

The stimulating effects of the electrical current have been used to great advantage in cases of loss of organic function. It is, therefore, indicated in some troublesome cases of anæmia, chlorosis, rheumatism, gout, constipation, &c., as well as functional disorders of the digestive tract.

Although the above account of Indigestion, and its Treatment, has been kept as elementary and brief as possible, I hope that sufficient has been written on the subject to show the reader how impossible it is to treat any case of digestive derangement by a fixed rule.

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